POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

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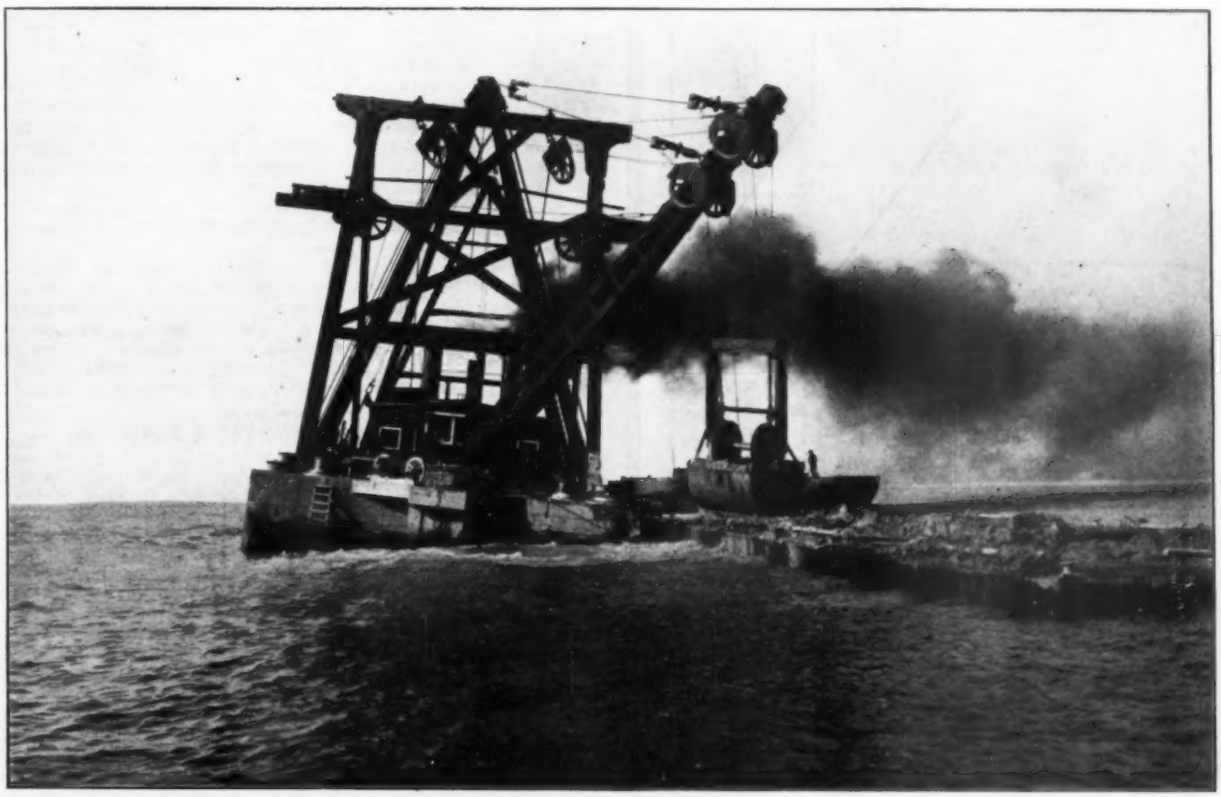
Vol. 3. No. 21. CHICAGO, MAY 23, 1903. PRICE 5 CENTS.

Largest Dredger on the Great Lakes



Each Operation of the "Clam Shell" or Bucket Brings Up Over Fifteen Tons of Bottom

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How Photographs of Stars Are Made.

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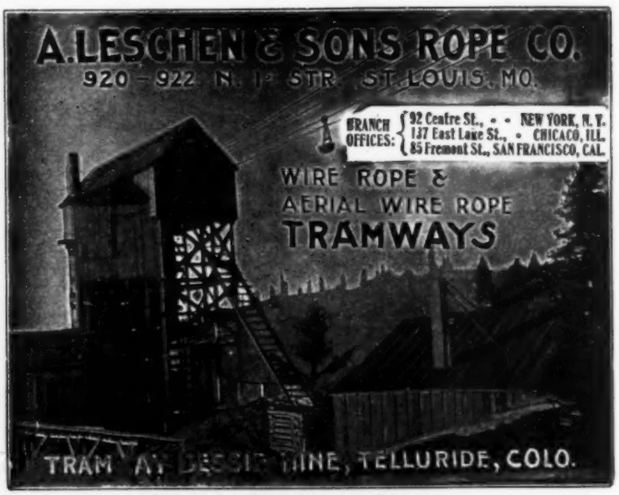
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ELECTRIC TANNING A FAILURE.

An electrical process which was to accomplish in a few days what had formerly required many weeks was heralded a few years ago. Time has not proved the value of the new process, but on the contrary has demonstrated that the electrolysis failed signally.

INSTANCE WHERE FIGURES LIE.

An ingenious resident of Denver who complies with the law to the extent of securing a license, but who also likes to exceed the speed limit a mere trifle—say 20 miles an hour—has his number displayed on a large card hung on the rear of his machine, but when he passes a policeman he draws the card into a horizontal position, making the number invisible except to persons who may be passing overhead in airships.

FALSE ALARM PREVENTIVE DEVICE.

The fire department of Washington, D. C., has been greatly annoyed during several years past by the striking of false alarms, and it has recently adopted a new kind of alarm box which, it is thought, will prevent this rather costly trouble. Every time an alarm is struck a bright light burns for several seconds from the top of the box, making it possible for any one in the vicinity to see the person plainly.

SMALLEST MAIL BOAT IN EXISTENCE.

Just One and a Half Feet Long, Yet Regularly Carries Letters From St. Kilda to Scotland.

A mail boat, the smallest in the world—so small that it can transport neither captain, nor crew, nor sailor, nor any person,—carries the mail from the Scotish island of St. Kilda to the outer world. This is the most remarkable system of mail transportation to be found in any part of the globe.

St. Kilda island is the most westerly of the Hebrides and lies far out in the Atlantic. It is visited but twice a year by regular mail boats. In the intervals between these visits the diminutive boat is brought into service.

The boat consists simply of a piece of plank about 7 inches wide, 4 inches thick and 1½ feet in length. This is pointed at one end like a wedge and a hole is bored sideways through it, while the other end is cut like a stern of a trawler, thus forming the rough model of a boat. In the center of the "boat" a hole 6 x 4 inches is cut. All the letters, together with the money for postage are placed in a flask which is securely inclosed in the cavity. The hole is covered with a hatch, which is tightly nailed to the wood so that no water can get in. On the bow is painted in large letters the word, "Open." Finally a buoy is attached to the boat by a cord passed through the bow. Then the little craft is committed to the sea and starts on its long journey. In due time it is always cast on the west coast of Scotland. Whoever picks it up is expected to buy the necessary stamps with the money contained in the boat and to post the letters. The Scottish people are honest and to their credit it may be said that the letters have never yet failed to reach their destination.

FINEST HARBOR IN THE WORLD BEING BUILT FOR BUFFALO.

City Will Become Great and Powerful From Work Now Nearing Completion—Greatest Dredge on the Lakes and a Wonderful Water Telescope Among the New Things Employed in the Construction.

By Emile Low, United States Assistant Engineer.

Editor's note:—Foreign engineers who have recently inspected the work now being done in the Buffalo harbor, declare that it will give to Buffalo the finest harbor in the world.

With the completion of the Stony Point extension and that which is promised within the present year, Buffalo will have the proud distinction of possessing the longest line of breakwaters in the world. The distance from the north end of the north breakwater to the shore end of the Stony Point breakwater is 4⅜ miles. With the Black Rock harbor included, Buffalo has thus a harbor exceeding five miles in length and more than one-half mile in width, certainly the most magnificent harbor on the lakes, if not in the world.

The building of the breakwater and the resulting establishment of this splendid harbor, combined with the building of extensive manufacturing plants within its boundaries, should cause the commercial and industrial importance of Buffalo to advance with more rapid strides than ever before.

Maj. T. W. Symons, Corps of Engineers, U. S. A., under whose supervision the great work is so satisfactorily progressing, was placed in charge of the Buffalo district in 1895. Prior to that time it was planned to build a harbor which would have been about 1½ miles long and ½ mile wide, which, of course, included the shallow as well as the deep water. Maj. Symons was not long in seeing that this proposed harbor was entirely inadequate, even for the present, as well as the future needs of Buffalo's rapidly growing commerce, especially after the construction of the immense plant of the Lehigh Valley at Tifft farm, which demanded an outlet to the lake and which could not be accomplished for want of sufficient outside protection. The extension of the breakwater to Stony Point was due to the untiring and energetic efforts of Maj. Symons. The extension consists of two types of breakwater; one, the so-called rubble mound or stone breakwater, 7,260 feet long, and the other, the timber crib breakwater, of which there is 5,600 feet. The stone breakwater consists of essentially a core of gravel, protected on both the lake and harbor sides by heavy covering of rubble stone, from 6 to 12 feet thick. The gravel is brought up to within 10 feet of the water surface where it is covered by rubble stone. Beginning at 10 feet below water level on the harbor side and 15 feet below on the lake side, the whole structure is capped by immense blocks of limestone, weighing from 7 to 17 tons. The width of the stone breakwater at the bottom is 135 feet and at the top 14 feet. It rises 12 feet above water level, thus having a total height of 42 feet.

An appliance called the water telescope is employed in laying the stone blocks below the water. By the use of this instrument the exact position of every stone can be seen, and the work when completed can be classed as a giant Belgian block pavement. The blocks of stone thus being laid together, and thoroughly keyed, especially at the top, are so firmly bonded, that no storm occurring on Lake Erie can ever dislodge them.

Adjoining the stone breakwater on the south is a timber crib structure, filled with stone, and about 2,800 ft. long. The breakwater jutting out into the lake from Stony Point is also of the same type, and is of the same length. Between the two an opening called the South Harbor entrance is left. This opening is for the convenience of shipping and is 600 ft. wide. Owing to the unstable material forming the lake bed in this locality, it was not deemed advisible to place the crib work directly on the same. Instead a trench was excavated down the bed rock. The trench was 50 to 60 ft. wide on the bottom and from 80 to 100 ft. wide on top. The bed rock in many places was 70 ft. and over below the water surface. As the ordinary dipper dredges are unable to dig in such a depth of water, a dredge of a different design and known as the clam shell was built. It can be said that this dredge was the largest and most

Fig. 1—At the Quarry; Fig. 2—Placing Stone in Position; Fig. 3—Completed Section.

efficient that ever operated on the Great Lakes. The clam, or bucket, has a capacity of 10 cu. yds. and weighs over 30,000 lbs. The resulting trench is filled with sand and gravel up to the level of the original lake bottom, and furnishes thus an unyielding foundation for the rubble stone layer and superincumbent cribs. This seems somewhat at variance with the Biblical injunction, which admonishes us all to build on rock and not upon the yielding sand.

In the construction of the stone breakwater, 250,000 cubic yards of gravel will be needed for the hearting or core, and over 650,000 tons of rubble stone to cover this gravel, and also to serve as a foundation for the large capping stone. This capping will require over 290,000 tons of stone.

The cribs forming the superstructure of the South Harbor and Stony Point breakwaters are built of hemlock timber except the top courses, which are of pine.

The longest span bridge in the world is now in process of construction across the St. Lawrence river about 7 miles west of Quebec, Canada.

MACHINE TO REPAIR ASPHALT STREETS.

The laying of a good asphalt pavement is a process requiring considerable machinery and specially trained and skilled workmen. When it is necessary to repair such a pavement, the process is even more difficult, if the work is going to last. The old method was to chop out with an axe until the hole or depression was removed and then put in new material and try to make it adhere to the old. Sometimes it did; quite as often the patch only made matters worse.

The illustration shows a machine known as the economic asphalt surface heater which is a combined steam roller and hot air blast. An intense heat is produced by burning an oil spray and the hot air thus produced is forced by means of a fan through pipes into the hood shown at the right of the engraving, and hung close to the pavement. A blast heated to 700 degrees is thus secured and quickly melts the

Melting the Pavement

asphalt, when slight depressions can be smoothed out with the roller seen at the front of the machine, or new material filled in before rolling. The lever at the left serves to raise and lower the hood. Municipal Engineering thus describes the work of the machine:

In a three-hour test during the afternoon of March 26, in Indianapolis, repair was made of 125 square yards of asphalt surface on a street which had developed such pronounced waves that by any other system of repair it would have been necessary to remove almost the entire wearing surface of the area repaired and replace it with new material. This would have required more than 15 tons of new material. With this machine, only 1,240 pounds of the old material were hauled to the dump, being the scrapings from the surface, mingled with the street dirt and one or two spots of dead material. New material amounting in weight to 3½ tons was necessary to fill in deficiencies due to wear and disintegration. The difference in favor of the method permitting the use of all the good old material is very marked. Even when the wages of the men employed are counted for an entire day the work done in the three hours cost very much less than the city is paying for asphalt repairs made in the ordinary way.

SIZE OF OBJECTS IN A PHOTOGRAPH.

The value of many a photgraph is greatly lessened or entirely lost through the failure to place some object in the picture the size of which is readily understood by the observer. A correspondent of the American Amateur Photographer suggests the use of a folding foot-rule, which can be opened and placed against many subjects to show the relative size which otherwise would not be appreciated.

BALLOON TRAVEL SEEMS MOTIONLESS.

It is one of the peculiarities of travel by balloon that you do not feel anything; all is still with you, no matter how fast you may be going, says Aeronautical World. You see you are riding with the wind; you move as fast as it moves; you are part and parcel of it, whether you wish to be or not. It takes you in its embrace so firmly, yet so softly, you do not know it is there. You may be in the teeth of a hurricane, but you never know it; all is calm and placid with you.

LIGHT MOST INJURIOUS TO THE EYES.

A Russian physician has made experiments to ascertain the kind of light that is most injurious to the eyes, says Cosmos. He has based his researches upon the well-known fact that the more tired the eyes are the more frequently they will close. Placing a person before the light of a candle he found that the eyes closed at an average of 6 4-5 times per minute; placing the same person before a gaslight he found that the closing of the eyelids averaged 2 4-5 times per minute. Then, using sunlight and electricity, he found that under the influence of the electric light the eyes closed the least number of times. He concludes that electric light is the least and candle light the most injurious to the eyes.

ROLLING CURTAIN FOR STEREOPTICON VIEWS.

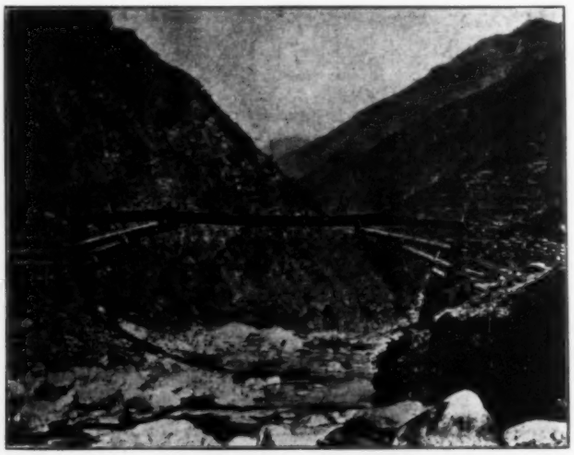
Who has seen what appeared to be a black curtain roll and up and down on the big white screen on which stereopticon views are shown, without wondering how the effect is produced? Of course there is no rolling curtain on the screen and if there was the picture would show upon it. A writer in the American Amateur Photographer gives the secret as follows:

"I employ a 'push-through' carrier to the lower front side of which is glued a piece of black cloth thick enough to exclude the light and large enough to cover the opening, its upper edge being glued round a small roller, actually one of Dixon's long pencils. The roller is hung by slight rubber carrier, and to admit of being gradually rolled down and to remain down while the slide is being shown.

"In commencing the exhibition, or rather just as the lights are being turned down after the usual introduction, and with the first slide in its place, the roller is slowly turned down, and being considerably out of focus, appears on the screen exactly as if a curtain was being rolled up. When the slide has been sufficiently shown the roller is gradually turned up, the next slide pushed in and the roller again turned down, or from the spectators' point of view, the curtain again rises, and so on to the end. It is a wonderful improvement on the ordinary show whether by merely displacing one view by another or by the so-called dissolving."

THE ORIGINAL CANTILEVER—PERHAPS.

The picture herewith reproduced from the Railroad Gazette is of a log contilever bridge near Darjeeling, in the Himalaya Mountains in northwestern India, on the border of Thibet.



Ancient Bridge with Modern Principle

It is understood that the design has been in use since a remote period. It will be seen that the mechanical principles involved are quite correct.

The converted naval yachts which are in possession of naval militia organizations will probably be returned to the government, as there is said to be pressing need for them by the navy department.

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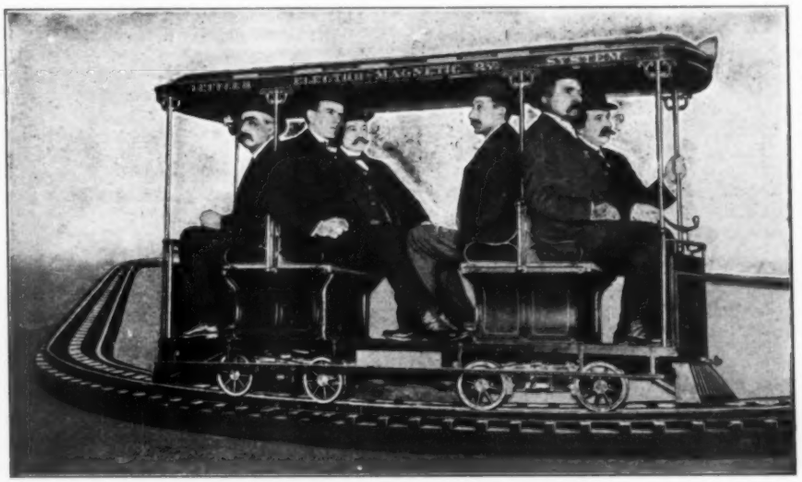

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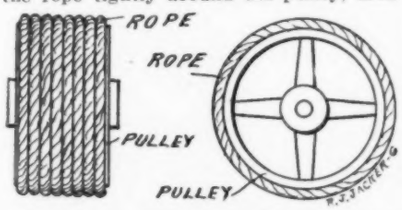
INCREASING DIAMETER OF PULLEYS.

Here is a good way to increase the diameter of a pulley. Take a 4-strand Manila rope and make one end fast with a hook-shaped quarter-inch bolt. Wrap the rope tightly around the pulley, making the other end fast in the same manner as the first one, says a corespondent in the American Miller.



I have an 8-inch pulley covered with inch rope and use it to drive a large wheat elevator. This is an inexpensive way to make a pulley larger and still leave the face true. It only takes a little time to do the work.

SOD CUTTER FOR RAILROADS.

A device for cutting sod has been put in service on the New York Central R. R., and is the invention of A. M. Clough, the supervisor of tracks. The device is attached to a handcar by beams and braces. It consists of a roller 24 inches in length, 12 inches in diameter and weighing 95 pounds. On the inside of the roller is an 18-inch cutting disk, which cuts to a depth of three inches. As the edge of the sod is cut off by the disk a small plow, which is attached to the roller in the rear, removes the pieces, leaving a clean-out edge. The device used for the first time produced excellent results.

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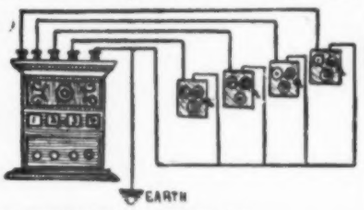

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The platinum sparking points of gasoline engines should be driven or riveted in position. Solder is uncertain as it is apt to melt and coat the points.

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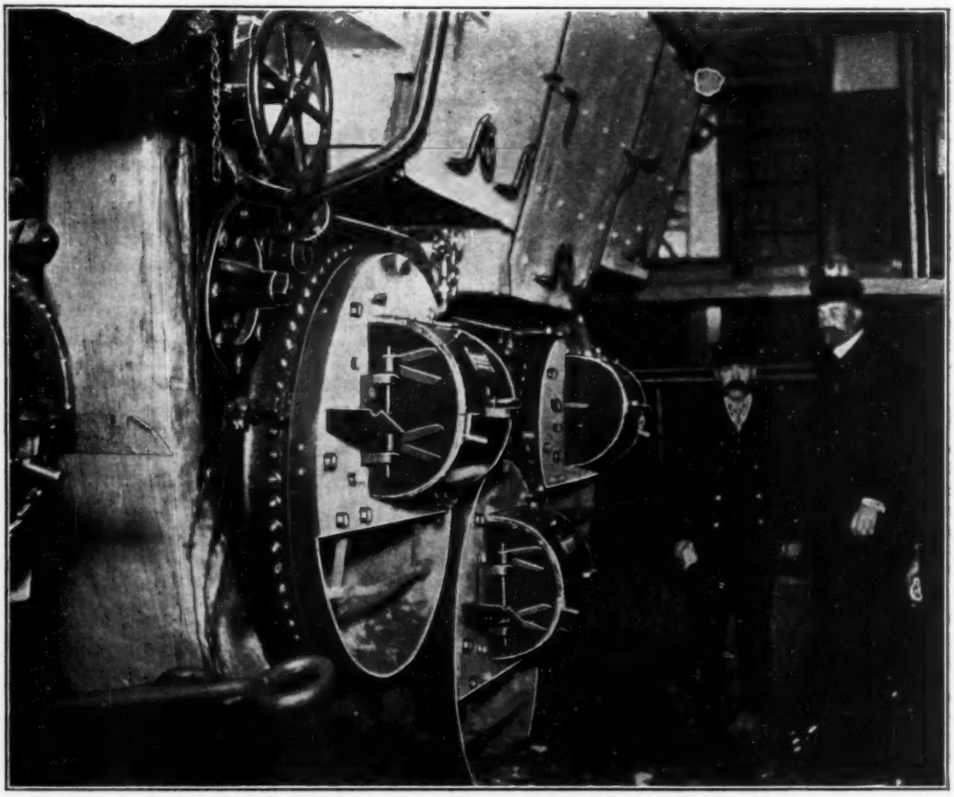
GOULD'S YACHT BURNS ITS SMOKE.

New and Novel Combustion System of the "Niagara," that Went to Europe and Back.

Howard Gould's Yacht "Niagara," which recently astounded the world by making a trip from America to Europe and back, is equipped with the hydro-carbon system of combustion, which was installed shortly before the yacht started on the journey. The vessel has three Scotch boilers, with three furnaces each (nine furnaces in all), giving 1,500 horsepower.

T. A. Donly, chief engineer of the yacht, says: "During the trip to Europe and back we found we could do the same work with two boilers (six furnaces) equipped with the hydro-carbon system on a consumption of 16 to 18 tons of soft coal per day, with average speed of 13 3-10 knots per hour, that we did formerly on all three boilers (nine furnaces) with a consumption of 24 to 26 tons of same coal per 24 hours and a speed of 10½ knots per hour."

The new system of combustion is one of several inventions that are serving to bring soft coal into a degree of favor that it has never enjoyed before, and may ultimately cause it to attain prestige over anthracite. In the usual manner of burning coal one-half of it is wasted by imperfect combustion, escape of smoke and cinders in the ashpit. It is well known that soft coal will produce more heat units than hard coal, but in the general methods of burning of soft coal so much objectionable smoke is produced by escape of free carbon that it has been largely prohibited in the cities. In the system installed on Gould's yacht this objectionable smoke is prevented and is converted into an active agency to produce power. A specially designed patented door apparatus is substituted for the ordinary fire door, so arranged that the air is heated first and passed into the fire chamber over the fire, and by a peculiar arrangement distributed in proper proportions (suited to varying conditions of fuel used or requirements), to form an induced draft, supplying to the carbon from the coal the needed amount of free oxygen to change the conditions of the combustible gases from carbonic oxide to dioxide and monoxide—thus obtaining from every pound of coal burned nearly double the amount of heat units, largely decreasing the temperature of escaping gases in the chimney and leaving in the ash pit only the clay residium of the coal. The carbon laden smoke from soft coal is prevented, as the carbon is turned into combustible gases and heat units in the fire chamber.



In the Boiler Room—Yacht Niagara

In the test of the McClean guns at Cleveland the one-pounder machine gun showed a speed of more than 300 shots per minute. The test of the infantry machine gun showed a speed of 800 shots per minute.

TIMBER USED IN NEW YORK TUNNEL.

Some idea of the amount of timber used in preparatory work, and in many instances totally unfitted for further use, can be gathered from the statement that in the construction of the rapid-transit tunnel which is building in New York there has been used up to date about $2,000,000 worth of timber and lumber, says the American Lumberman. After it has been taken out of the tunnel it is of no further use except for firewood, the dampness and mud spoiling it for anything else.

A FLOATING SAW MILL.

The floating machine shop Vulcan, used by the navy department during the Spanish war, created much interest at the time of its inception. There is now a similar novelty on Lake Champlain, but in this instance in the woodworking line, says the Wood-Worker. A floating sawmill is in use there, which resembles its predecessor the ark, but with modern improvements. It is a two-story structure, with boiler, engine and saw mill on the first floor, or lower deck, according to whether the saw mill or marine features are supposed to predominate, and the quarters for the crew on the upper deck. There was a time when a great deal of timber was cut on the shores of Lake Champlain, but now the shores are not so heavily wooded as formerly; there are, however, many stray ends of timber that can be profitably worked up into lumber by this floating mill.

NOTABLE AERIAL VOYAGES.

Charles Green, the most famous aeronaut of his day, and the father of modern ballooning, made an ascent from the Vauxhall Gardens, in company with Monck Mason and Robert Holland, M. P., in 1836, which established a record that stood for many years, says the Aeronautical World.

The ascent was made at half-past one on November 7, in "The Great Nassau," a balloon which had been specially built by Green, and which was the largest balloon in existence, being sixty-five feet in height and over forty feet in diameter, and holding 85,000 cubic feet of gas, whilst its lifting power was about a ton and a half. The voyagers were supplied with provisions enough to last them a fortnight, and some of the best scientific instruments of the day were also carried. After a journey devoid of all unpleasantness, but full of variety and interest, they made a most successful descent at Weilburg, in the Duchy of Nassau, the following morning, having traveled over 500 miles in less than eighteen hours.

In 1846 a Frenchman named Arbau made a voyage from Paris across the border, landing near Turin, but the details of his journey are lacking.

The highest ascent ever made was that by James Glaisher, a Fellow of the Royal Society and the superintendent of the meteorological department of Greenwich Observatory, and Henry Tracy Coxwell, on September 5, 1862, when they ascended from Wolverhampton, and reached the enormous altitude of nearly 37,000 feet, or upwards of seven miles, in less than an hour. Glaisher had become insensible from the cold and the rarity of the atmosphere at a height of 29,000 feet, but his instruments clearly proved that the greater height had been attained. Coxwell's hands were frozen, and he had to grasp the valve-line with his teeth in order to descend, and both he and Glaisher suffered considerably from their long exposure.

The voyage from England to France was first accomplished on New Year's Day, 1786, by Blanchard, the celebrated French aeronaut, accompanied by an American named Jeffries. Their journey was most exciting and so critical did the situation become at one point that the intrepid voyagers had to cast away a large proportion of their clothing in order to prevent the balloon falling into the sea. Ultimately, however, they succeeded in reaching the French coast in safety, and effected a descent near the forest of Guines. Blanchard was commanded to appear at court by the king of France, and was awarded a pension of fifty pounds a year for life.

In 1804 Count Zambaccari made an ascent at Bologna, with the idea of reaching Milan, accompanied by a Dr. Gassetti and Pascal Andreoli. The ascent was made at night, and through some strange miscalculation was a great deal more rapid than had been anticipated, and the balloon soon reached an enormous altitude, and both Dr. Gassetti and the count lost consciousness through the extreme cold. Signor Andreoli almost became insensible, but his labors in restoring his companions to consciousness prevented any serious effects in his case. When the count regained his senses he was at a loss to know where the balloon had drifted to, but he was not long left in doubt, for on attempting to descend, the sound of the sea was heard, and before ballast could be thrown out the car was dragging along the surface of the Adriatic. Casting out ballast, they managed to ascend again, but only for a short time, and the balloon was soon once more dragging along in the water. Luckily the now almost empty envelope served as a sail, and prevented them sinking, and after being dragged hither and thither for some hours, they were ultimately rescued by a passing vessel.

Combined Hearse and Carriage

A Chicago man has built and put in service here several vehicles which are a combined hearse and carriage. For poor people, on whom funeral expenses always fall heavily, the new departure is a great blessing. The vehicle is the usual size and weight of a closed carriage. As shown in the illustration, a compartment is placed in front of the passenger compartment for the reception of the casket, which may be not to exceed 54 inches in length. This compartment is lined with galvanized iron and separated from the passengers by an air space. The casket is securely held in place by clamps operated from the driver's seat. In cases of funerals occuring from contagious diseases the draperies are first removed and the compartment fumigated after the trip. The vehicle has been approved by the board of health, which will not allow the carrying of a casket in the same compartment with passengers.

The New Hearse-Carriage

WIRELESS SUBMARINE TO REACH THE POLE.

Two late inventions—the submarine boat and wireless telegraphy—are to solve the problem of reaching the north pole if the expedition now being organized by Dr. A. Kuempfe of Munich, Germany, does not meet with failure. It is intended that the submarine boat shall go under the ice to the farthest point north and carry men and supplies. A wireless telegraph station will be erected between latitude 79 and 81 degrees north. The submarine boat will also be equipped with wireless submarine apparatus and will communicate with the station whenever it is able to rise above the ice to the surface of the water. The station will in turn convey the information as to the progress of the expedition to the civilized world.

There are 1,200 locomotives in daily use in Japan and 500 of them are of American manufacture. Lower prices and quicker execution of orders did the work.

WHEAT FLOUR DOES NOT CAUSE APPENDICITIS.

No, wheat flour does not cause appendicitis, says a medical authority, and we may all return to our white bread once more. He says:

"It is utter rubbish to assert that appendicitis is due to the use of good flour. The flour of our ancestors differed from the flour of to-day only in the relative amount of the germ of the wheat, which in modern milling is removed, to the great advantage of the consumer. It is ridiculous to assert that the presence in the flour of the germ made the bread any more easily digestible. On the contrary, such bread is less digestible, and the same is true of the whole wheat flour now affected by the faddists.

"The bran has been removed from flour for many centuries and no one fully acquainted with the subject will care to eat flour containing the indigestible, worthless mass of bran. It is a good fodder, certainly, but I would suggest that hay is cheaper and will answer exactly the same purpose.

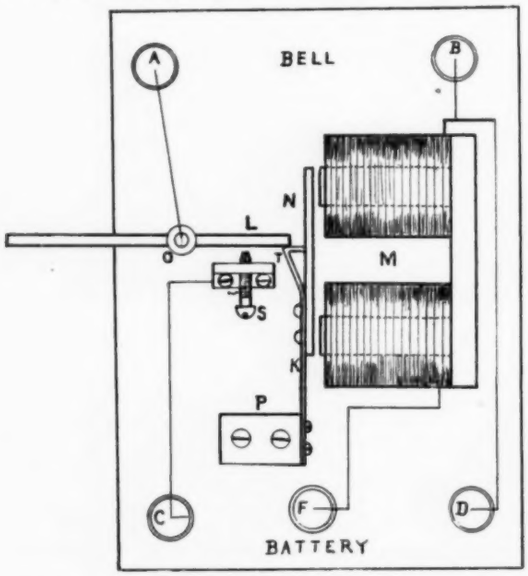
"Appendicitis was common long before modern flour was produced and long before it was recognized as a distinct disease, or before it was successfully treated. It is due to derangement of digestion in the lower digestive tract and is most frequently developed in people who have reason to worry and who, therefore, do not digest their food well. It is more likely to occur in one who eats whole wheat flour than in one who does not, and, finally, it need never occur if the digestion is properly looked after by an intelligent physician."

Easy Electrical Experiments

By L. P. Dickinson

AN AUTOMATIC CIRCUIT CLOSER.

Sometimes it is desirable to so arrange a circuit, normally open, that when once closed it shall stay closed even though it be opened again at one point. For instance, an electric door bell may be so arranged as to ring continuously when once the push button is pressed even though the pressure is but instantaneous. Or, an electric alarm clock may be desired to work in conjunction with an ordinary electric bell



The Automatic Circuit Closer

so that the alarm once started will ring continuously unless stopped by some one.

One way of accomplishing these results is to use an automatic circuit closing device such as is shown in the accompanying sketch. Take a piece of ¾-inch board 4 inches wide and 5½ inches long. Upon this board is to be mounted an electro magnet shown at M. This magnet is so simple that directions for building it will not be given. Its principal dimensions, however, are as follows. The length between centers of cores is 1½ inches, the length of core is 1¼ inch, the diameter of the latter is ⅜ inch and the outside diameter of coils is 1 inch. They are wound of No. 32 double silk covered magnet wire. Fine wire is used so that the magnet will have a high resistance for a reason that will be explained later. The center of the magnet is 2½ inches from one end of the board and about ½ inch clear space is left between the back of the magnet and the edge of the board.

At N is a soft iron armature about 3-32 inch thick. It is fastened to a thin brass spring shown at K. As will be seen, this spring projects about 1⅛ inches beyond the armature and is supported at its outer end by being screwed to the wooden block P. At its upper end the brass spring is bent up into a peculiar hook projecting about 3-16 inch outward from the middle of the armature.

Next provide a brass lever shown at L, about 2¾ inches long, ⅛ inch thick and ¼ inch wide. This lever is pivoted at O, at a distance of about 1⅛ inches from the nearer end of L. This is accomplished by boring a small hole through the piece and passing a screw through this hole into a block supported upon the wooden base. The lever should be so located upon the base that its end rests upon the hook shown at T when the armature N is farthest from the magnet core. When the armature is drawn toward the core, however, the lever L should slip from the hook and strike against a screw S which is supported by a strip of brass bent over at right angles and fastened to the base board.

Five binding posts are provided in the position shown and the connections for the various parts of the apparatus are shown by lines. The bell to be rung is attached at the top, the battery is connected to the posts C and D, and the push-button, or other circuit closing device is connected to posts C and F. It is assumed that the apparatus is to be supported in a vertical position. If connections are made as just indicated, the pressing of the button connecting C and F will send a current into the binding post D, from there through the magnet to the binding post F, thence to C, and to battery again. This will draw the armature N toward the magnet and allow the lever to fall against the screw S. The current will then have another path from the post D to B, through the bell to A, from A by means of the lever L to S, thence to the binding post C and battery. This will cause the bell to ring continuously, even though the connection between C and F be broken. The ringing can be stopped by pulling down on the projecting part of the lever L.

An ordinary alarm clock may be easily arranged to close an electric cuircuit when its own bell rings, and this in turn may start another bell by means of the device just indicated, which will ring until stopped by someone.

The device might also be applied in a very simple manner to a burglar alarm system.

THE WYOMING LEAVES MARE ISLAND.

Pretty Moonlight Picture Presented as the Cruiser Steams Through the Golden Gate at Night

A prettier sight has rarely been witnessed than that of the new cruiser Wyoming as she passed majestically through the "Golden Gate" at San Francisco, on her way from the Mare Island naval station to the open sea to engage in the recent gunnery practice in which she demeaned herself so nobly. The scene was at night and a full moon showed the outlines of the graceful cruiser silhouetted against a milken sky with the black promontories reaching into the sea from either side. The clouds above were bordered and interspersed with the silvery tints that only a California moon can paint.

The Wyoming was built at a cost of nearly $1,000,000. She

Photographed by Moonlight

has 3,214 tons displacement, 3,218 horse power and makes a speed of 11½ knots per hour. Her main battery consists of two 12-inch breach loading rifles and four 4-inch rapid-fire guns; secondary battery, three 6-pounders and five 1-pounder rapid-fire guns and two Colts.

The telegraph battalion at Berbera, on the Somali coast, Africa, will keep the British columns, as they advance against the Mullah, in touch with the vessels anchored at Verbera by means of wireless telegraph.

All employes of the Wells-Fargo Express Company over 60 years of age, who have been in the service for 20 years, will be pensioned. The order takes effect from Jan. 1.

The New York, New Haven & Hartford railroad has ordered conductors to prohibit card playing on the trains of that line on Sunday.

Minnesota proposes to make it a misdemeanor for any railway to raise a freight rate or abolish any joint rate without the consent of the state railroad commission under a penalty of $100 for every day of violation.

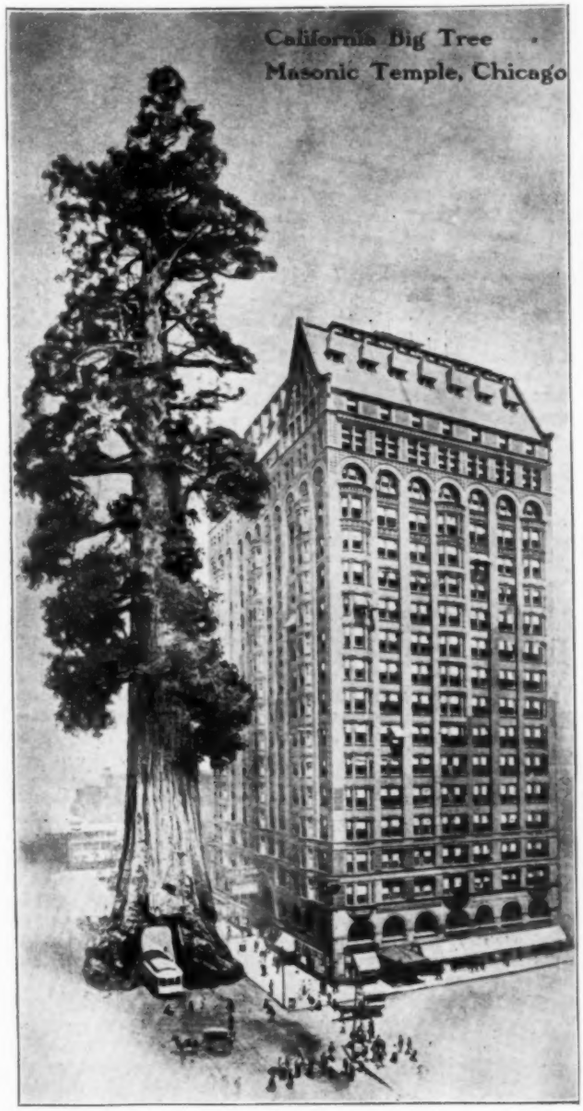
The Journal d'Agriculture Tropicale of Paris says that the use of rice flour in breadmaking is not new, that it was used in Paris years ago.

THE LARGEST LIVING THING ON EARTH.

New Found Tree in California Is Secure From the "Woodman's Vandal Axe."

In all the years that people have come from lands near and far to view the great trees of California—the largest in the world—the one really largest of all large trees remained secreted from human eyes. It stood, and yet stands, in the heart of the Sierra Nevada woodlands, towering like a giant above all that grows around. It seems that nature has assisted in the preservation of this pride of the world's forests, for it was planted on a spot destined to remain unsullied by the devastations of human invasions until the spot should come under the protecting care of the Nation's government. For this tree, which has just been discovered, stands on government land. The tree is a redwood. The discovery was accidental and was made by a party of hunters. Since then scientists and government officials have viewed the monster growth, and the Nation, as a warning to the woodsman and curiosity seekers, has publicly proclaimed that it is on government ground.

The tree will be called the Californian, in honor of the state that gives it growth. Old Methuselah, in the Tule grove, that has heretofore claimed the honor of being the world's largest tree, must now surrender the palm to the newly discovered redwood. Old Methuselah has a base circumference of 110 feet. The Californian is 156 feet in circumference six feet from the ground, and is 350 feet high. The Grizzly Giant, 104 feet around; the General Grant, 106 feet, and the General Sherman, 101 feet, will all lose their prestige now.



Comparative Size of the World's Largest Tree, 350 Feet High, and Building, 305 Feet High

The Giant "Californian"

Some of the great redwoods of California show the effects of old age; but while the Californian is by far the largest tree in existence, it seems to be yet young and still growing. It is not believed to be more than 5,000 years old, while the age of old Methuselah and other of the monsters are estimated at more than 8,000 years. The Californian is believed to be good for 5,000 more years, and hence will probably live to see greater changes in the world's history than have taken place in its past life, among which might be mentioned the flood, the rise and fall of a score of nations, the upheaval of mountains and the sinking of continents. The Californian is the largest living thing upon the earth.

CURIOSITY OF BALLOONING.

If, when riding in a balloon at a height of, say, 2,000 feet, a charge of guncotton be fired electrically 100 feet below the car the report, though really as loud as a cannon, sounds no more than a mere pistol shot, possible partly owing to the greater rarity of the air, but chiefly because the sound, having no background to reflect it, simply spends itself in the air. Then, always and under all conditions of atmosphere whatsoever, says the Aeronautical World, there ensues absolute silence until the time for the echo back from earth has fully elapsed, when a deafening outburst of thunder rises from below, rolling on often for more than half a minute.

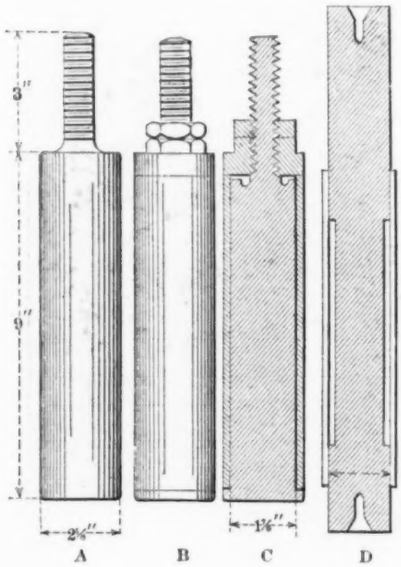
CURE FOR NOSEBLEED.

The best remedy for bleeding at the nose is the vigorous motion of the jaws, as if in the act of chewing, says Medical Brief. In the case of a child, a wad of paper should be inserted to chew it hard. It is the motion of the jaws that stops the flow of blood. The remedy is very simple, but has never been known to fail in a single instance, even in the severest cases.

SHOP NOTES

RENEWING OIL PUMP PLUNGERS.

Where fuel oil is burned under pressure there is usually frequent renewing of the pump plungers. A correspondent in the American Machinist tells how they renew the plungers at his plant. The plungers were originally as shown at A. They were turned to receive sleeves or drawn steel tubing and threaded for the clamping arrangements as shown at



B and C. The tubing was turned to size and faced on both ends on the arbor shown. The sleeves are kept on hand, but are more durable than either the solid machinery steel or brass plungers used before. While taking two or three minutes longer to put on than a solid plunger the arrangement has the advantage of lower first cost, greater durability and keeping the plunger to a constant size, thus saving packing.

MOVING A HIGH STEEL STACK

A steel stack 110 feet high and weighing 12 tons, standing on the site of the burned hat factory of F. Berg & Co., Orange Valley, N. J., was recently moved a distance of 175 feet. The first step toward the work, says the Railway Review, was to fasten an iron band near the top of the stack. This band carried four eyes for attaching guy ropes, which kept the stack in a vertical position while it was being moved. The guy ropes were fastened to trees and poles in a manner to permit the necessary adjustments as the position of the stack was changed, and flags were placed at the top of the stack to indicate the direction of the wind. To stiffen the stack against stresses due to the moving operations steel guy cables were attached to the stack at a point about 60 feet from the ground, and these were fastened to the platform upon which the stack was moved by means of turnbuckles. The platform of heavy timber was a crib work built beneath the stack after it had been freed of its anchor bolts and jacked up. Timber ways were laid and the pulling was done with a chain carried around the base of the stack and attached to a cable led to a windlass worked by horse power. A code of signals was arranged to insure proper adjustment of the guy cables and the stack was moved without particular trouble of any kind. When the stack arrived over the new foundation it was jacked up free from the platform crib, the timbers were removed and it was lowered to the anchor bolts.

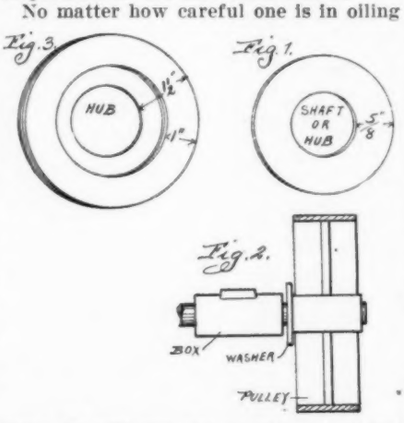
TO LOOSEN STOPPERS THAT ARE STUCK.

1. Hold the bottle firmly in the hand or between the knees and gently tap the stopper on alternate sides, using for the purpose a small piece of wood and directing the strokes upward, says the Photo-Beacon. 2. Plunge the neck of the bottle in hot water, taking care that the water is not hot enough to split the glass. If the stopper is still fixed use the first method. 3. Pass a piece of lint around the neck of the bottle, which must be held fast while two persons draw the lint backward and forward. 4. Warm the neck of the bottle before the fire and when it is nearly hot the stopper can be removed. 5. Put a few drops of oil around the stopper where it enters the neck. Next warm the bottle before the fire and then apply process No. 1. If the stopper still remains immovable repeat the above process until it gives way, which it is almost sure to do in the end. 6. Take a steel pin or needle and run it around the top of the stopper and the angle formed by it and the bottle. Then hold the vessel in the left hand and give it a steady twist toward one with the right. If this does not succeed try process No. 5, which will be facilitated by it

TO PREVENT OIL GETTING ON BELTS.

The accompanying sketch shows an idea which I put into practice to prevent oil from getting on roller belts and also belts of other machines says a correspondent in the American Miller.

No matter how careful one is in oiling



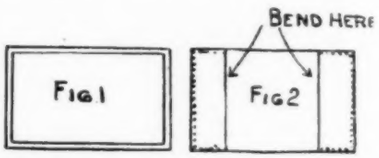
some oil will run out of the end of the journal box, especially when the box occasionally gets warmed up a little. The oil will follow the shaft and get into the pulley, or, when the pulley is up to the bearing, as on the counter shaft in roller frames, it follows the hub of pulley and from the pulley gets onto the belt and will in a short time rot the leather.

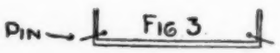
With a washer cutter I cut out washers from old leather belts, as shown in Fig. 1, to fit tight on shaft or hub of pulley, placing them 1-16 to ⅛ of an inch from the end of the box, Fig. 2. Revolving with the shaft, the washer causes the oil to drop from the end of the box to the floor. The pulley instead of being wet will keep dry and gather dust.

For a Eureka Separating Scourer I cut one large washer to fit the hub of the pulley and two narrow ones, same diameter, and fastened them with wood shoepegs, one on top of the other, and the two on top of the first one, as shown by Fig. 3. When it is not convenient to use leather washers, I keep the oil from following the shaft by tieing a string around the shaft, close to the bearing.

HOW TO MAKE A PHOTO PRINTING FRAME IN FIVE MINUTES.

Lesoir writes as follows in the English Mechanic: "Requiring to do a lot of printing in a hurry and having no extra frames, I improvised several from old negative boxes which answered admirably. Take the lid part of a common





cardboard negative box and cleanly cut the top therefrom, leaving a rebate of about one-eighth inch all round, as shown in Fig. 1. This constitutes the frame. The box part of the negative box answers for the back and is made as follows: Draw pencil lines some distance from and parellel with the end edges and cut the bottom where shown by the dotted lines (Fig. 2) close to the sides of the box, and bend inwards at the pencil marks. If a stronger job is required pieces of cloth may be pasted on as in ordinary frames and the bottom pasted at the center lines. To use, lay the negative on the lid, the edges resting on the rebate; put the printing paper in place and lay a pad of blotting paper on top; then insert the box part, bottom first, and secure with two pins stuck through the sides, as shown in Fig. 3. It is obvious that the frame thus made could be strengthened by the judicious application of paste and binding cloth, but in any case it will answer if made as above."

Publisher Popular Mechanics—You will find enclosed order for $2 for one year's subscription to Popular Mechanics. It is the best paper I can find to read and I want it regularly.—James B. Musbaum, Monessen, Pa.

MAKING BUTTON-HEAD SCREWS.

Some time ago I happened to be located at a small electrician's as "general engineer," says a writer in the American Machinist. To repair a rheostat we required some button-head screws. The sketches tell the tale of how these were made in a short time. One-eight-inch diameter brass wire was cut into lengths and threaded in the lathe, one end short and the working end long. Under the short threaded end was screwed a brass washer (tapped) as shown in Fig. 1. The apparatus for making the rounded head is shown at Fig. 2. This consists of the half of a copper float ball mounted upon a three-legged stand and containing solder. A small circular gas burner, a can of cleansing material made up of resin and spirits, and a can of clean water complete the outfit.

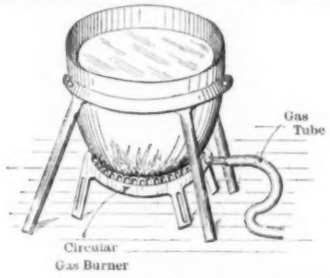


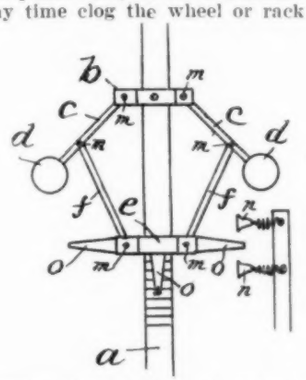
FIG. 2 MAKING BUTTON-HEAD SCREWS. FIG. 3

To make the button-head the brass wire with washer head was dipped, washer down, first into the cleansing paste and then into the molten solder, causing a drop to form upon the bend, and also to solder the head fast to the wire, then into the water.

Dipping the molten drop into the water caused it to partake of a perfect button-shaped form, so well formed that it gave the bolt a nicely finished appearance, needing no finishing whatever. (See Fig. 3.)

HOME-MADE ELECTRIC SPEED INDICATOR FOR WATERWHEELS.

The following simple and easily made device is described in the American Miller, and while suggested to millers will answer equally well in any other water-driven plant. Ice, leaves or rubbish may at any time clog the wheel or rack and preventing the full flow of water reduce the speed of the machinery.

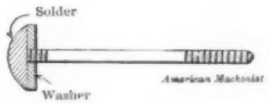


The accompanying drawing illustrates a cheap indicator which will serve the purpose for a small mill, where the outlay for one of the patented machines would be seemingly large.

Most small mills have the old upright shaft indicated in the drawing as a; if not, the device can be constructed on a shaft of its own and driven by a belt or a small pair of bevel gears. The reader can readily grasp the idea, as the principle of the engine governor, as well as that of centrifugal force is involved.

A collar b is attached to the shaft and to this collar are fastened the arms c and the balls d. Another collar e is fitted closely around the shaft and to it are attached the arms f and the projections o. Care should be taken that the joints at m act freely.

FIG. 1



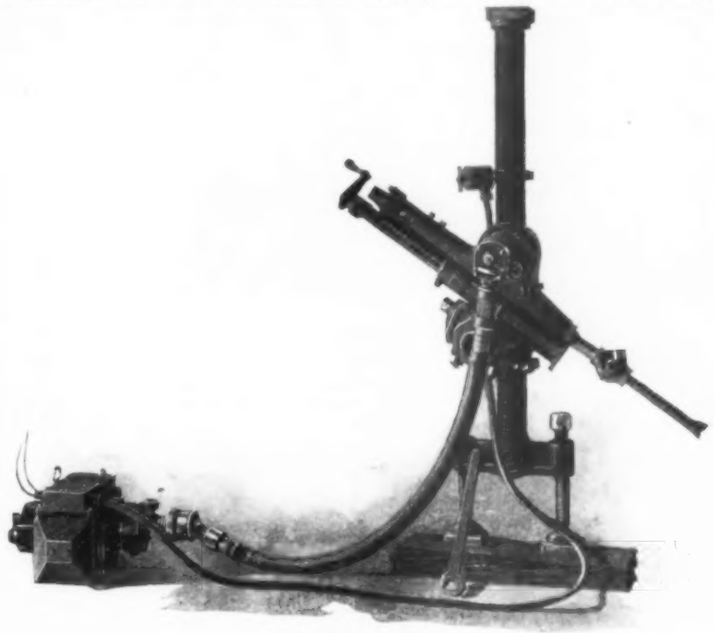
An increase in the speed will naturally cause the balls to rise, also the collar e, which indicates the speed by means of the lower projection on the shaft which carries a series of rings made of white paint or strips of paper pasted thereon. Should the motion become too high or too slow an alarm will be sounded by the horizontal projections striking against the bells n. These bells are attached to small coil or steel springs to prevent them breaking off.

"Never dodge cows. They are stupid and will move about in ways least expected. You had better stop short and see what they are going to do about it," is the advice of an old automobilist. Then he gallantly adds: "A woman acts very much like a cow or a sheep. First she stops and then she jumps, and she is just as likely to jump in the path of the machine as not."

AIR DRILL VS. ELECTRIC

Electric Machine Winning Favor Among Miners and is a Candidate for the Championship

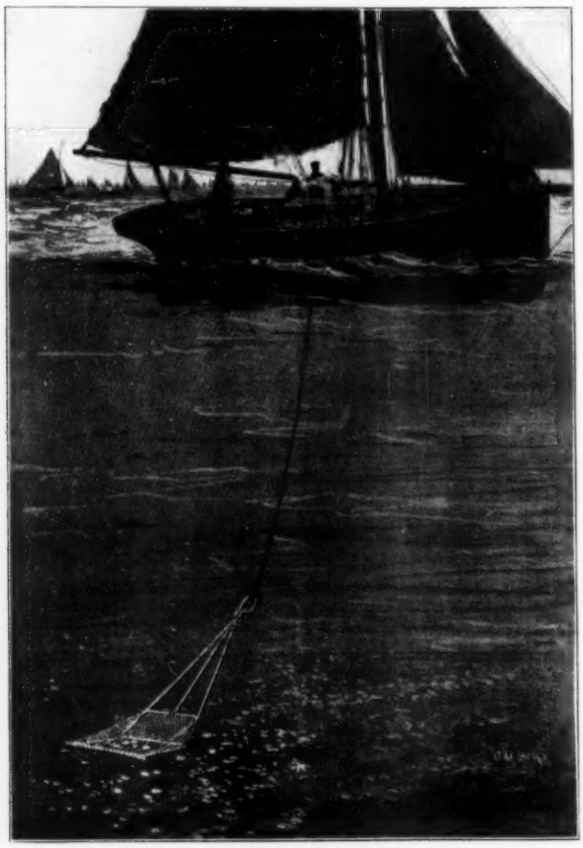
The compressed air drill, which for some time has occupied a position of superiority thought by many to be unapproachable, has at last met a rival—a rival that may wrest from it the championship. The new claimant for distinction is the electric drill. It works satisfactorily in the hardest rock and runs steadily in bad ground where the air drill cannot make but a few strokes without sticking in the hole. The machine is very small and compact and needs no expensive foundations. The power transmission line is lighter and cheaper to put in place and can be easily removed to other working places. It is no trouble with the electric power to put a light where required and to place a small motor-driven fan where it will do the most good with the minimum of power. In mining where large amounts of power are used and where a large number of small units are required under ground it is rapidly winning favor. The new electric drill is manufactured by the Mine and Smelter Supply Co. The drill follows along the lines of the air drill in the methods of its construction with such changes as the difference in power necessitate. It is driven by a small electric motor provided with speed-controlling devices. The power of the motor is conveyed to the drill through a short, flexible shaft, which allows the motor to be placed in any convenient position close to the drill. The piston of the drill, through a simple mechanical device, is given a rapid forward stroke and a much slower return. This rapid forward stroke concentrates the power upon the rock, while the comparatively slow return stroke gives a powerful pull to release a drill from a fissured hole. To prevent shocks on the mechanism of the drill buffer springs are used, through which the power is transmitted to the piston.



Electric Rock Drill

DREDGING OYSTERS IN ENGLAND.

Dredging oysters is an occupation that gives employment to thousands of persons in the cultivated oyster farms of Europe and America. The accompanying illustration shows



English Method of Dredging Oysters

the method employed in Whitstable whence England's finest oysters come. The dredge is lowered by rope from the yawl and dragged along the bottom of the sea, thus scooping up the mollusks in large quantities.

MANURE ON CONCRETE.

A contribution to the literature on the subject of the effect of various materials used to protect concrete from frost is made by Mr. Walter Buehler, an assistant city engineer in Indianapolis.

Municipal Engineering says: "A portion of the concrete section of the Northwestern avenue sewer was not completed before cold weather last fall and some of the concrete last laid was protected by covering. Some of the concrete which had set for about one week was covered with straw containing manure, some was covered with straw only and some was left uncovered. During the week the concrete had become hard but had probably not completed its final set. The portion covered with manure was found this spring to be quite soft and easily disintegrated on the surface; that covered with straw was harder, but the surface could be picked off readily, while the portion which had not been covered was hard and its surface was in perfect condition."

Car No. 53 of the Schenectady Railway Company made two miles a minute in a recent run from the Federal Building in Albany to the car houses in Schenectady.

The tests of turbines at Elberfeld, Germany, show a steam consumption equivalent to about 11 pounds per indicated horsepower. This is probably an unparallelled performance in economy.

No values like Popular Mechanics want ads.

A NAVAL JOKE.

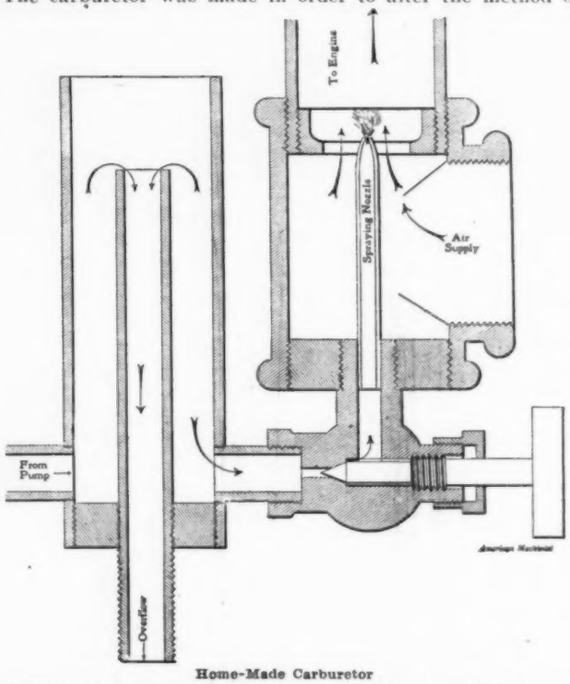
At an amateur dramatic performance in the Naval Academy on April 1 one of the instructors played a new April fool joke. The audience had assembled and everything was in readiness for the curtain to be rung up, when one of the instructors made his appearance, carrying in his hand a telegram. "I wish to make an announcement—a very sad announcement," he said in funeral tones. "Under the circumstances it scarcely seems fitting that the entertainment should proceed. Word has just been received that one of the navy's vessels has gone down with all on board!" A hush of horror followed this gravely delivered speech, for most of those in the audience were connected by close families ties with the navy. "What was the name of the vessel?" came a voice from the rear of the hall. "The submarine boat Holland," replied the instructor, as he dodged and made a hasty exit.

A HOME-MADE CARBURETOR.

The accompanying sketch shows a carburetor which I had made some time ago for use on a 10 horse-power engine, says a correspondent of the American Machinist. It is made entirely of common gas pipe and fittings, with the possible exception of the needle valve. This was used because it was at hand, but probably any ordinary gas cock could be used in place of it, as this adjustment was seldom altered after being once set.

The carburetor is of the constant level type used on most stationary engines in which there is a pump to draw the gasoline from a lower level. The top of the overflow pipe should be about ⅜ inch below the top of the spraying nozzle, the air opening at the mixing point should be reduced to about ⅞ or 1 inch diameter and the end of the spraying nozzle should be flattened out so that there is a slot in the end about 1-32 inch wide.

The carburetor was made in order to alter the method of



Home-Made Carburetor

governing the engine from hit-and-miss to throttling for the purpose of making some comparative tests. It was used at various speeds and loads and gave uniformly good results. A machinist did all the work in about half a day, and in operation I could not see but that it was just as satisfactory as though much time had been spent on special drawings, patterns and fine brass castings.

The movement of grain for export through New Orleans last month amounted to more than 5,000,000 bushels, and 52 large ocean-going steamers were required to handle the shipment.

Any analine salt or oil dying process will yield good results, says the Textiles Record, if the experimenting dyer will take pains to study and observe the details.

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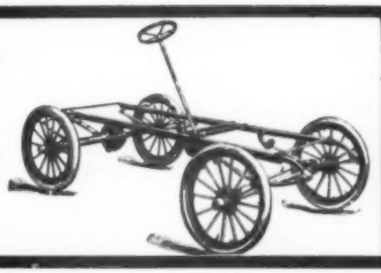
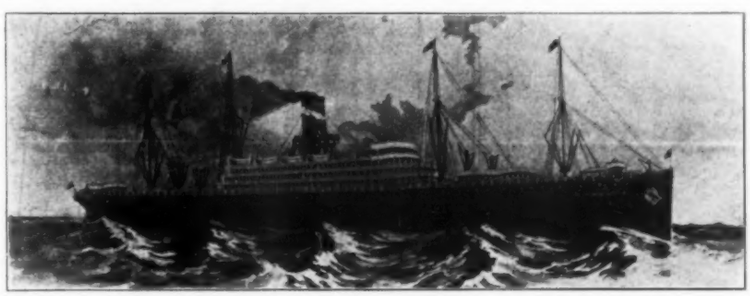


STEAMSHIP MINNESOTA THE LARGEST EVER BUILT IN AMERICA.

Into the Thames river at New London, Conn., slid a great mass of shapely steel 630 feet long, 73 feet 6 inches beam and



The Mammoth S. S. Minnesota

56 feet from keel to upper deck—the Minnesota. This ship is the largest ever built in America. In the hull are 12,000 tons of steel plate and she will carry 21,000 tons of freight and nearly 3,000 passengers. The vessel will carry 5,000 tons of coal for her own fuel, which is sufficient to make the round trip, Seattle to Yokohama and return. Most of this coal is stored above the boilers, to which it drops by gravity. The engines are of 10,000 horsepower.

HOW PHOTOGRAPHS OF STARS ARE MADE.

Dr. H. H. Turner, in his Traill Taylor lecture, mentioned the following successful method of getting over the difficulty of making the ordinary large telescopes suitable for astronomical photography. He said:

"While on the subject of instruments for photographing the stars I feel sure that an audience of photographers will be interested to learn that a simple device has recently been successfully used to transform a visual telescope into a photographic one. If we remove the eyepiece of an ordinary telescope and put a sensitive film at the focus, we might get a photograph, but it would be a wretchedly bad one, because the lens is arranged to focus the yellow or visual rays and not the violet rays, which are most photographically active. Hence existing large telescopes cannot be used as they stand for taking photographs. Various devices have been suggested for adapting them to photography. The most direct and most costly is to have an entirely new object glass, as in the large Paris telescope shown in the exhibition of 1900, or an additional lens, as in the Lick telescope, or to reverse the crown lens of the ordinary flint and crown combination and alter the separation of the lenses, as in the 28-inch refractor at Greenwich; or to have some correcting lens near the focus. All these methods have disadvantages of a serious kind. Mr. Ritchey, of the Yerkes observatory, has adopted the much simpler plan of photographing with the yellow light, which is focused, and stopping out the light which is not. He uses a yellow color screen just in front of the sensitive film, and, of course, isochromatic plates. His pictures of the moon with the great Yerkes telescope under these conditions are the best that have ever been taken, and he gets also wonderfully fine pictures of star clusters. The drawback to the method is that the exposure required is rather long, so that it is not applicable for faint objects; for these, however, we can use reflecting telescopes."

AT THE CIRCUS.

Same old circus,
Same old band;
Same old sawdust,
Same old stand;
Same old beasts, and
Same parade;
Same old peanuts,
Same lemonade;
Same old clown and
Same old jest;
Same old crowd with
Brand-new zest.

SAND EXTINGUISHES ELECTRICAL FIRES.

The value of sand as a fire extinguisher is sometimes appreciated in cases of oil fires, but its value in electrical fires is not so generally known. A pail of dry sand saved a $75,000 electric light plant not long ago. One of the switches refused to work properly and caused an arc which would have very soon set fire to the building had not the superintendent thrown sand into the switch and stopped the trouble. The superintendent had protested when the concern requested that he should keep a supply of sand on hand for just such an emergency, but now he would not be without it.

WIRELESS BETWEEN SWEDEN AND GERMANY

A scheme for the establishment of a permanent wireless service between Sweden and Germany is near realization. The naval authorities are actually engaged in the erection of a number of stations fitted with Marconi's apparatus. The first experiments will be conducted between the military port of Karlskrona and the German station of Arkona on the Island of Ruegen. Means will probably be found in future for establishing a direct service between Sweden and the northwest coast of Germany without any intermediate stations.

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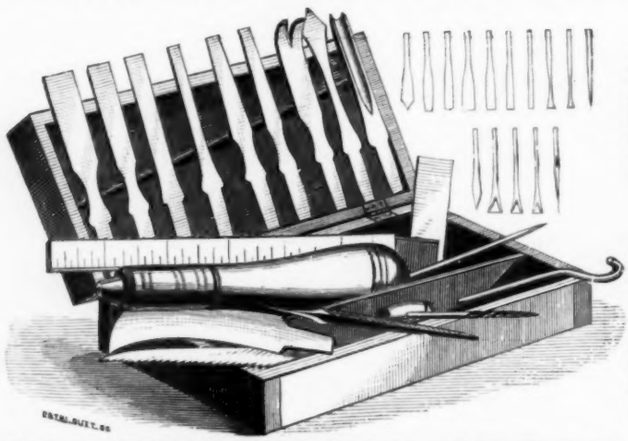

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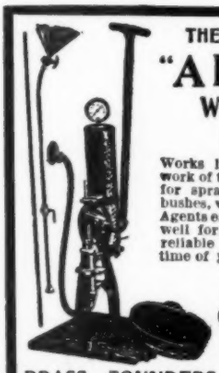
CAPTURING YOUNG EAGLES A HAZARDOUS TASK.

The American bald eagle, the lion of the air, and the bird chosen as an emblem of our country, is a formidable foe in combat with either man or beast, and capturing the young birds for exhibition in zoological gardens is a task always attended with more or less danger. Even the baby eaglets that have not yet left their nests are extremely savage when attacked, and often can wreak severe punishment on their captors. The eagle's strength is so enormous that it is almost beyond conception. An eagle weighing sixteen pounds can carry away a lamb of sixty pounds weight. To do this it must develop about two horsepower and must put a strain or more than 1,100 pounds on the muscles of its wings. As stated in a previous article in Popular Mechanics, this leads one to think that the eagle is stronger than mathematics.

High in the crags of the mountains or in trees topping mountain peaks, the eagle seeks a seclusion to build its nest. The more inaccessible the spot the more favored it is by this bird of wondrous flight and vision. So an invasion of the eagle's domicile always means multiform adventures. Seldom is the escapade within the camera's range, and so the accompanying picture showing the capture of two young eagles in the mountains of California is a rarity. The captor is W. A. Graham, of San Jose. The picture was taken by companions who stood in waiting below, ready to shoot the parent birds should they attack him. Graham is endeavoring to place the young eaglets in a bag after having invaded their nest, which was built 100 feet above the ground. The tree stood on the rocky brink of a high bluff. The main trunk leaned far out over the dizzy cliff. If Graham had lost his hold he would have been dashed to death on the sharp rocks of the mountain's side, fully 300 feet below. The tree was surrounded by a dense growth of underbrush that made its approach most hazardous. As is usual at this height in the mountains, a gale was blowing, thus greatly increasing the peril of climbing the tree. But Graham is used to adventures in the mountains, and the obstacles only lent interest to the undertaking. Luckily for Graham, the parent birds were not at home when he called. But the eaglets, unaided by their protectors, showed that they were not entirely defenseless. Many times Graham thought he would be forced to abandon his mission, and blood flowed in profusion from his hands and arm before he succeeded in placing the two ferocious little captives in a bag so that he could let them down from their airy height by means of a rope, and consign them to a life's imprisonment in a zoological garden. Graham successfully made the dangerous descent, and the party had just reached safety at the foot of the mountains when an eagle's fierce scream was heard, and looking up the men saw the old birds madly dashing through the trees and pouncing down on everything that chanced to stir, in search of the destroyers of their home.

Capture of the Eagles



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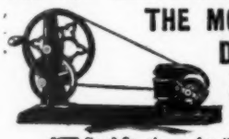
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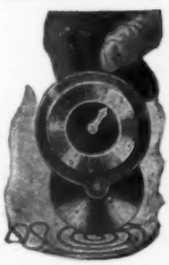
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(From What to Eat.)

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His lungs are sponges dried;
His blood is bouillon-concentrate
In veins of leather hide.

His muscles creak like pulley ropes
When hurried into play;
His hair is like piano chords—
Some chords are lost, they say.

His heart's a little globe of punk—
A house of constant gloom,
For love can never burn within,
Because there isn't room.

His appetite has dwindled down
To fit his little food,
Till fruit is "water in a poke"
And bread is "so much wood."

Hot apple tarts and pumpkin pies—
He reads of them aghast;
And waffles brown and chicken stew
Are "terrors of the past."

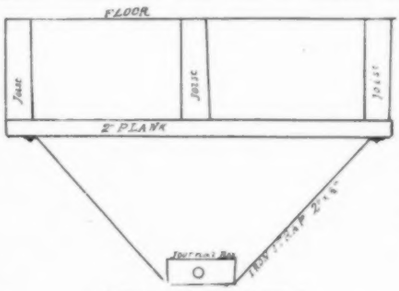
And, smiling, from his vest he slips
A tiny box of tin,
With capsules brown and pellets pink,
All rattling within.

Then, with a gulp, he swallows down
His dinner from the can—
This product of the health-food school,
The Concentrated Man!

—Aloysius Cole.

SHAFT HANGER FOR LIGHT DUTY

The sketch shows the application of an easily made shaft hanger for light duty. The part I wish to call particular attention to is the wrought iron strap, which can be bent and drilled by any good blacksmith and can be bolted to



Home Made Shaft Hanger

beam or ceiling, as shown in the drawing, says a writer in the American Miller. For a short elevator shaft, or one with no great amount of strain, a strap one-half inch thick and two inches wide will be sufficient.

HEAT-PROOF PUTTY

Mixing a handful of burnt lime with 120 grams of linseed oil and boiling down to the usual consistency of putty, then allowing the plastic mass to spread out in a thin layer to dry in a place where it is not reached by the sun's rays, yields eventually a very hard putty. When required for use it is made plastic by holding over the funnel of a lamp and applied to the articles to be cemented. On cooling it regains its previous hardness.

The Hotel World says that a big hotel in Havana, Cuba, would fail; that the climate is bad for health-seeking patients and that the purse of natives and number of tourists would not warrant high prices.

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